

On Serial Verbs in Mandarin Chinese:  
VV Compounds and Co-verbial Phrases

Claire Hsun-huei Chang  
University of Hawaii

1. Introduction

For a linguistic theory that includes the concept of a universal grammar as a basic assumption, variation among typologically different languages demands an explanation. Recently, some linguists adopting the theory of Government & Binding (GB) or its related theories as their frameworks have sought to formulate 'parameters' to account for such typological differences among languages.

One of the remarkable differences among languages is the existence or absence of serial verb constructions (SVCs), and this distinction affords a testing ground for the validity of such claimed parameters. Languages, such as Yoruba, Sranan (Baker 1989, Sebba 1987) differ from languages such as English and French in allowing SVCs. Baker (1989) proposed a Generalized Serialization Parameter to capture this difference. He proposed that verbs in SVCs are heads and form a double-headed construction. Verbs in a SVC are able to theta-mark an internal argument, which is their shared object. By allowing a double-headed construction, principles already existing in the theory, such as the Projection Principle and the Theta Criterion, can then explain limitations of the serialization of verbs, the linear order of the component verbs, and the position of their NPs.

We agree in principle with Baker's definition of a narrow scope SVCs, which excludes coordinations, embedded clauses, and small clause predicates. However, we disagree with his treating SVCs as a purely syntactic phenomenon involving nothing but a shared object. In stead, we propose an analysis in which syntax (constituent structure), semantics (shared reference), thematic structure (lexical semantics of predicates as in Jackendoff 1972, 1987), and conceptual structure (Principle of Temporal Sequence as in Tai 1985) constitute independent principles in the grammar of Mandarin Chinese that properly describe and explain its SVCs. We will provide a precise definition for SVCs in Mandarin Chinese and try to rectify Baker's account of SVCs by going beyond syntax. We propose temporal sequence and shared reference as two important constraints for the serialization of verbs in Mandarin. These two important constraints jointly distinguish the SVCs from coordinate construction, which is a seemingly similar structure to SVCs and has been mistakenly included in SVCs (Li & Thompson 1981). We address the issue of compounding in Mandarin Chinese, which is an important SVC (cf. Sebba 1987) but is totally ignored in Baker's account. We will explore the restrictions on compound formation, which involve thematic structure and constituent structure. Compounding in Mandarin poses a potential problem for Baker's double-headed analysis of SVCs, which allows verbal inflection to occur in both verbs. The inflectional morphology as it involves the placement of perfective aspect marker *-le* in Mandarin indicates otherwise. That is, there is only one *-le* in each VV compound and each SVC.

This paper is organized as follows: section 2 defines SVCs in terms of the two important constraints of the Principle of Temporal Sequence and shared reference. Section 3 proposes a possible approach for V-V compound formation in Mandarin Chinese based on thematic structures. Section 4 examines co-verbial phrases, which can be viewed as a deviant form of SVCs. Section 5 investigates the placement of *-le* in terms of the thematic structure of verbs. Section 6 concludes the paper.

## 2. Definition of SVC

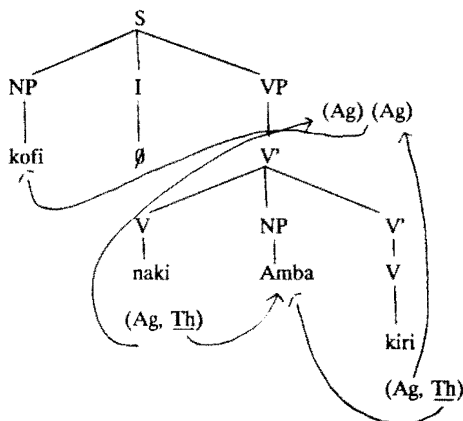
In this section, we will briefly summarize Baker's (1989) account of SVCs in African languages and offer a precise definition of SVCs in Mandarin Chinese.

Serial verb construction, generally speaking, is defined as a surface string of verbs or verb-like or verb phrase-like items which occur within what appears to be a single clause (Baker 1989, Sebba 1987). Usually, there is only one tense/aspect specification for the whole chain of verbs, and the verbs also have a single structural subject and share logical object (Baker 1989). Based on African languages, Baker eliminates structures of coordinations, embedded clauses, and small clause predicates from the possible domain of SVCs. He proposes that a SVC is a double-headed structure, in which two heads (i.e. verbs) share an internal argument, that is, object. The following example (1), followed by its tree structure (2), is what Baker claimed to be a genuine SVC.

- (1) Kofi                      naki    Amba kiri.  
     Kofi                      hit     Amba kill

'Kofi struck Amba dead.'

- (2) Tree structure of sentence (1)



Baker claimed that both verbs are heads and both project to the higher level. VP and the higher V' are projections of both verbs. The crucial feature of SVCs, according to Baker, is the 'shared object'. In sentence (1), the verbs naki 'hit' and kiri 'kill' assign a theme role to Amba, which is the shared object of both of these two verbs.

## 2.1. Previous analyses of SVCs in Mandarin

Discussions on SVCs in Mandarin Chinese have been rather sporadic. The existing analyses (Li & Thompson 1981, Tsao 1986, Chu 1983) belong to functional approaches and do not give explicit definitions, not to mention capturing important constraints of the serialization of verbs. Li & Thompson and others consider SVCs as having a syntactic structure of (NP) V (NP) (NP) V (NP). They recognized four types: (1) two separate events, which are further divided into 'consecutive', 'purpose', 'alternating', and 'circumstance', (2) one verb phrase is the direct object or the subject of the other verb, (3) pivotal construction, (4) descriptive clause. As a result, the syntactic structure for SVCs, as given, includes all kinds of irrelevant structures as SVCs but leaves out relevant structures as non-SVCs. But as we mentioned in the introduction, genuine SVCs exclude coordinations, embedded clauses, and small clause predicates. Immediately, some of the SVCs in type 1 (i.e., coordinations) and all of those in type 2 (i.e., embedded clause) and type 4 (i.e., small clause predicates) must be excluded from SVCs. Li & Thompson indicate that various components of the meaning of the verb determine the type of interpretation accorded to the entire serial verb construction (Li & Thompson 1981: 621) and state that SVCs are to express one overall event or state of affairs. It seems vague as well as vacuous to give a semantic definition of the relation between the VPs based on the meanings of the verbs. And unfortunately, the definition of an overall event is not clear, though the intuition is correct. Li & Thompson's intuition can be stated precisely within a vigorous treatment of SVCs, which is what we will attempt to do now.

Before our discussion of SVCs in Mandarin, a word of definition is in order. SVCs in Mandarin are defined as structures in which verbs are in a series and share a common NP. Serialization of verbs in SVCs is constrained temporally, that is, the verbs in series hold a temporal sequence relationship. The shared common NP denotes a shared reference. SVCs have a structure of [NP [<sub>NP</sub> V NP V]] or [NP [<sub>NP</sub> V V NP]]. These two types of SVCs are genuine SVCs in a narrow sense. There is only one aspect marker for each SVC. The so-called coverbial phrases, which have a structure of [<sub>NP</sub> V NP V (NP)] (the first verb being the co-verb), also allow one aspect marker and are considered as a type of SVCs.

## 2.2. SVCs and Temporal Sequence

Verbs denote events, states, or actions. When a sentence contains only one verb, there is no problem as far as the placement of aspect markers or the location of NPs is concerned. When two or more verbs are involved, the order of the verbs, the placement of aspect markers, and the location of NPs become an issue. Mandarin does not have overt linguistic markings to indicate the relation between verbs when verbs or verb phrases are in series. For example, Mandarin does not have to use a coordinate conjunction, such as and in English, to mark the coordination, and it does not use a subordinate phrase marker, such as to in English, to mark the subordinate phrase which

is generally comparable to an infinitive phrase in English. Thus, the structure and interpretation of the following sentence can be ambiguous.

- (3) Ta            zhong cai            mai4 cai.  
he            plant vegetable    sell    vegetable

'He plants vegetables and sells vegetables.'

'He plants vegetables to sell.'

The two events, *zhong cai* 'grow vegetables' and *mai4 cai* 'sell vegetables', in sentence (3) can either be in a coordinate construction, which means two events are independent events, or in a subordinate construction, which means two events occur sequentially, one depending on the other. The coordinate construction will not be counted as an SVC, as we indicate previously. The subordinate construction may. If we reverse the order of the two events in sentence (3), as shown in sentence (4), the coordinate structure (interpretation) remains, but the subordinate structure disappears.

- (4) Ta            mai4 cai            zhong cai.  
he            sell    vegetable    plant    vegetable

a. 'He sells vegetables and plants vegetables.'

b. '\*He sells vegetable to plant it.'

Why is it so? Presumably, when the surface order does not give us much clue, we have to depend on other knowledge or principles to interpret the relation between two linguistic units in a sentence. One such principle is the Principle of Temporal Sequence (PTS) (Tai 1985). The interpretation that an event depends on the event preceding it is based on our understanding of the real world, in which events unfold along a time dimension (Tai 1985, Hsieh 1989b). The second interpretation of sentence (3) denotes two events occurring sequentially, because our real world knowledge tells us that one has to plant vegetables before one can sell them. Our real world knowledge prohibits us from interpreting selling vegetables before planting them, as the second English translation of sentence (4) shows.

The PTS, as Tai (1985) stated, says that the relative word order between two syntactic units is determined by the temporal order of the states or events that they represent in the conceptual world. This has further been modified by Li (1990) to include the situation where there is a dependency relation between these states or events and there is no overt linguistic marking indicating that relation (Li 1990: 108). In fact, dependency relation in the revised PTS, essentially, is understood in the temporal-sequenced dimension. Thus, it is sufficient to say that our knowledge about the real world will in general determine the structural relations between two syntactic units. Thus, coordinate structure is free from the constraint of temporal sequence, but subordinate structure depends on temporal sequence.

Given the PTS as a constraint for SVCs, the structural ambiguity in sentence (3) is still not solved. That is, sentence (3) has a dual structures of coordination and subordination. If it is coordination, it is not an SVC. If it is subordination, it may be an

SVC. The dilemma of its status leads to the second constraint for SVCs, that is, shared reference.

### 2.3. Shared Reference

When two events are in coordinate structure, there is no dependency or other constraint between the two verbs or verb phrases. That is, the order of verbs won't change the meaning of the entire sentence (cf. first interpretation of sentences (3) and (4)). Each verb will be followed by its individual NP, if there is any, and the references of NPs (such as cai 'vegetable' in sentence (3)) are different. When two verbs or verb phrases are in subordinate structure, there is a dependency between these two verbs. The dependency can be based on cause-effect or temporal sequence. When two verbs are in temporal sequence relation, they are expected to share an entity. When nouns refer to the same thing, one of them can be and tends to be deleted for the sake of economy. That is why it is clumsy and redundant to repeat the second noun phrase in sentence (3) with the subordinate and temporal-sequence reading. Examine the following sentence, in which an NP is deleted under same reference (*e* denotes a deleted noun, and indices mark the references of NPs):

- (5) Ta            zhong cai            mai4 e.  
he            plant vegetable            sell

'He plants vegetables to sell.'

The order of verbs in sentence (5) is the same as that in sentence (3), that is, zhong 'plant' precedes mai4 'sell'. The only difference is that the second NP cai 'vegetable' in sentence (5) is empty. When this NP is empty, sentence (5) is no longer a coordinate structure but a subordinate structure, a true SVC, in which the relation between two verbs depends on their temporal sequence. With the existence of sentence (5), sentence (3), whose structure is potentially ambiguous, is somehow reduced to a coordinate structure.

### 2.4. Shared reference or shared object

We have attempted to justify the Principle of Temporal Sequence and shared reference as two distinct constraints for SVCs. Let us examine Baker's syntactic approach in terms of the shared object. Examine the following:

- (6) Ta            dao    le    san    bei    cha    he    le    yi    bei    e.  
he            pour    ASP    3            MW    tea    drink    ASP    1            MW    e

'He poured three cups of tea and drank one of them.'

Cha 'tea' is the shared object of both verbs dao 'pour' and he 'drink' in sentence (6). The sentence should be an SVC in Baker's definition. It is not so. Sentence (6) is the result of deletion under coordinate reduction, not deletion under same reference. We need to revise our notion of shared reference to include measure words, because measure words in Mandarin carry referential information. Compare sentence (7) with sentence (6):

- (7) Ta        dao   le    san   bei   cha   he.  
       he        pour ASP 3    MW tea drink

'He poured three cups of tea to drink.'

What is deleted and shared in sentence (7) is san bei cha 'three cups of tea'. Deletion in sentence (7) is not the result of coordination reduction but deletion under same reference. Sentence (6) and sentence (7) are in contrast. Sentence (6), having a shared object, is not an SVC but a reduced coordinate construction. Sentence (7), having a shared reference, is an SVC. The notion of shared object would mistakenly include sentence (6) as an SVC. Therefore, shared object is not a criterion for defining SVCs. Rather, shared reference is. Of course, it is possible for Baker to restate his shared-object condition so that the object shared is not just the head noun but rather the whole NP. In that case, the two NPs would be identical precisely because they have identical reference.

We repeatedly point out that coordinate constructions are not SVCs, and now we are able to distinguish between coordinate constructions and SVCs. Shared reference and temporal sequence constraints provide a guideline for making such a distinction. Only when both constraints are met can a structure be considered an SVC.

## 2.5. Serialization of Verbs

Temporal sequence as one of the necessary conditions for SVCs has a great bearing on the constraint of serialization of verbs. Sentences such as (4) are excluded from SVCs, because the two events in sentence (4) do not have a dependency of temporal sequence and are two independent events. Because sentence (4) is not an SVC, the following sentence (8) is not an SVC, either:

- (8) \*Ta        mai4   cai        zhong e.  
       he        sell   vegetable   plant

Sentence (8) is ungrammatical, because the two noun phrases do not have the same reference. Deleting a noun without a shared reference with another noun would yield an ungrammatical sentence. Shared reference and temporal sequence together explain the restriction of serialization of verbs: the order of verb has to be zhong 'plant' > mai4 'sell' (as in sentence (5)) not \*mai4 'sell' > zhong 'plant' (as in sentence (8)), and deletion is effected only if the noun and its deleted copy have the same reference, as in (5). Baker (1989) has to resort to other principles, such as the Projection Principle, the Theta Criterion, and the Thematic Hierarchy (Larson 1987) to constrain the serialization of verbs. The Principle of Temporal Sequence explains the constraint of serialization of verbs elegantly, virtually without having to invoke principles similar to those invoked by Baker.

At this point, we might ask ourselves two questions: (1) Is the deletion rule a well-motivated rule in the grammar? If it is, then, (2) Does the deletion rule delete the second noun or the first one? Let us address the first question first.

## 2.6. Deletion

Deletion is a well-motivated rule in natural languages and in Mandarin as well (Huang 1988b). It is well-attested that a noun whose reference is indicated by another noun is usually deleted or empty for the reason of economy. If nouns with the same reference are not deleted, the sentence can become awkward. Compare the following two sentences:

- |     |           |            |         |          |            |      |
|-----|-----------|------------|---------|----------|------------|------|
| (9) | ?Zhongguo | difang hen | da,     | Zhongguo | renkou     | hen  |
|     | China     | place very | big,    | China    | population | very |
|     | duo,      | Zhongguo   | wuchan  | hen      | fengfu.    |      |
|     | numerous  | China      | produce | very     | bountiful  |      |

'China has a large territory, large population and bountiful produce.'

- |      |          |            |      |           |            |      |          |
|------|----------|------------|------|-----------|------------|------|----------|
| (10) | Zhongguo | difang hen | da,  | e         | renkou     | hen  | duo,     |
|      | China    | place very | big, | e         | population | very | numerous |
|      | e        | wuchan     | hen  | fengfu.   |            |      |          |
|      | e        | produce    | very | bountiful |            |      |          |

'China has a large territory, large population and bountiful produce.'

Sentence (9) usually is not used, unless we intend to emphasize the reference China.

Sentence (10) is a normal utterance, in which nouns of the same reference are deleted.

To answer the second question, that is, whether deletion rule deletes the first or the second noun, we need to begin by considering the phenomenon of coordinate deletion in natural languages, an interesting fact first printed out by Ross (1967).

### 2.6.1. Directionality Constraint

Ross (1967) proposed a general rule of directionality constraint, which stipulates that in a coordinate sentence deletion must go forward if the identical elements left-branching in a tree, but backward if they are right-branching. Sentence (10) is an instance of forward deletion, because the identical elements occur on the left-branches of a tree. The sentence is grammatical, because there is no violation of Directionality Constraint. Compare sentence (10) with the following:

- |      |          |            |      |           |            |      |          |
|------|----------|------------|------|-----------|------------|------|----------|
| (11) | *e       | difang hen | da,  | e         | renkou     | hen  | duo,     |
|      | e        | place very | big  | e         | population | very | numerous |
|      | Zhongguo | wuchan     | hen  | fengfu.   |            |      |          |
|      | China    | produce    | very | bountiful |            |      |          |

Sentence (11) is an instance of illegal backward deletion and so it is ungrammatical. The identical elements in sentence (11) occur on the left-branches, and the deletion should have been forward not backward.

If the Directionality Constraint is the sole condition for deletion, we should be able to predict that (12a) below is grammatical and (12b) is ungrammatical:

- (12) a. \*Ta            zhong e<sub>i</sub>            mai4 cai<sub>i</sub>  
         he           plant           sell   vegetable
- b. Ta            zhong cai<sub>i</sub>            mai4 e<sub>i</sub> (=5)  
         he           plant vegetable       sell   e<sub>i</sub>

‘He plants vegetables to sell.’

However, the reverse is true. Although the identical element occurs on the right-branches of the tree, deletion has not been backward as the Directionality Constraint stipulates. There must be another principle at work that would explain why sentence (12a) is bad but (12b) is good. We will discuss another type of deletion, anaphoric ellipsis, as suggested in Huang (1988b), and ellipsis may be an explanation of this exception to the Directionality Constraint.

## 2.6.2. Anaphoric Ellipsis

Huang observed that there are several problems in the traditional treatment of A-not-A questions by deriving them uniformly from disjunctive questions through putative coordination deletions. The problems arise mainly because the Directionality Constraint of Ross is violated. Therefore, he suggested to derive the problematic types of the A-not-A question from other sources and through other means than coordination reduction. The following sentence violates the Directionality Constraint and should be ungrammatical, but it is in fact not.

- (13) Ni            xihuanzhe    ben   shu   bu   xihuan e.  
      you        like    this   MW   book   not   like

‘Do you like this book or not?’

What is deleted in sentence (13) is the second copy of the identical element, zhe ben shu ‘this book’. The deletion in sentence (13), involving an A-not-A question, and in sentence (5), involving an SVC, is the same. That is, identical elements in both sentences do not follow the Directionality Constraint. Rather, identical elements are deleted through anaphoric ellipsis, which deletes the second copy of the identical elements.

Interestingly enough, when verbs are in a temporal-sequence relation, anaphoric ellipsis applies (sentence (14)). Otherwise, Directionality Constraint applies (sentence (15)).

- (14) Nei            ge    xuexiao            zhaoshou            xuesheng            xulian            e.  
      that        MW   school            recruit            students            train

‘That school recruits students to train.’



(Two events of zhaoshou xuesheng 'recruit students' and xulian xuesheng 'train students' are in a temporal-sequence relation, and anaphoric ellipsis applies to delete the second element.)

- (15) Nei      ge      xuexiao      zhaoshou      e      xulian      xuesheng.  
that      MW      school      recruit           train      students

'That school recruits and trains students.'

(Zhaoshou xuesheng 'recruit students' and xulian xuesheng 'train students' are two independent events. There is no temporal dependency. Directionality Constraint of backward deletion applies to delete the first identical element.)

The following are more examples of the interaction between the temporal-sequence constraint and the Directionality Constraint on deletion:

- (16) a. Ta              mai3    xigua,              mai4    e.  
         he              buy    watermelon    sell

'He buys watermelons to sell.'

(This involves temporal sequence and identical indices; thus, the deletion of an identical element is based on anaphoric ellipsis and bypasses the Directionality Constraint.)

- b. Ta              mai3    e,              mai4    xigua,  
         he              buy              sell    watermelon

'He buys and sells watermelon.'

(No temporal sequence and (in general)  $i \neq j$ ; Deletion of an identical element obeys the Directionality Constraint.)

- (17) Zhangsan      zhu    fan,      Lisi    chi      e.  
Zhangsan      cook    rice      Lisi    eat

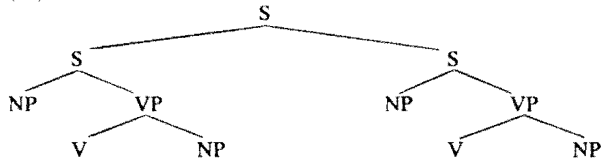
'Zhang cooks and Lisi eats.'

(temporal sequence and identical indices; anaphoric ellipsis applies and deletes the second identical element.)

## 2.7. SVCs or Coordinate Construction

We have shown that coordinate constructions and SVCs are different in terms of shared reference and temporal sequence. It is assumed, though, that both constructions are derived from the following structure:

(18)



By examining the following set of sentences, we are able to see it clearly that both shared reference and temporal sequence are important constraints for distinguishing genuine SVCs from pure coordinate constructions.

- (19) a. (ta<sub>i</sub>        zhong shu<sub>i</sub>)<sub>t</sub> ,        (ta<sub>i</sub>    mai4 shu<sub>i</sub>)<sub>t</sub>  
           he,        plant trees<sub>i</sub>        he<sub>i</sub>        sells trees<sub>i</sub>

‘He<sub>i</sub> plants trees<sub>i</sub> , and he<sub>i</sub> sells trees<sub>i</sub>.’

(‘t’ is time index for the event.)

(Full coordination, no deletion, no temporal sequence)

- b. (ta<sub>i</sub>        zhong shu<sub>i</sub>)<sub>t</sub> ,        (ta<sub>i</sub>    mai4 shu<sub>i</sub>)<sub>t+1</sub>  
           he,        plant trees<sub>i</sub>        he<sub>i</sub>        sells trees<sub>i</sub>

‘He<sub>i</sub> plants trees<sub>i</sub> , and then he<sub>i</sub> sells trees<sub>i</sub>.’

(Full coordination, temporal sequence, no deletion.)

- c. (ta<sub>i</sub>        zhong shu<sub>i</sub>)<sub>t</sub> ,        (ta<sub>i</sub>    mai4 shu<sub>i</sub>)<sub>t</sub>  
           he,        plant trees<sub>i</sub>        he,        sells trees<sub>i</sub>

‘He<sub>i</sub> plants trees<sub>i</sub>, and he<sub>i</sub> sells trees<sub>i</sub>.’

(Full coordination, same-reference agents, no temporal sequence, no deletion.)

- d. (ta<sub>i</sub>        zhong shu<sub>i</sub>)<sub>t</sub> ,        (ta<sub>i</sub>    mai4 shu<sub>i</sub>)<sub>t+1</sub>  
           he,        plant trees<sub>i</sub>        he<sub>i</sub>        sell trees<sub>i</sub>

‘He<sub>i</sub> plants trees<sub>i</sub> , and then he<sub>i</sub> sells trees<sub>i</sub>.’

(Full coordination, same-reference agents, temporal sequence, no deletion.)

- e. (ta<sub>i</sub>        zhong shu<sub>i</sub>)<sub>t</sub> , (e<sub>i</sub>    mai4 shu<sub>i</sub>)<sub>t</sub>  
           he,        plant trees<sub>i</sub>    e<sub>i</sub>        sell trees<sub>i</sub>

‘He<sub>i</sub> plants trees<sub>i</sub>, and sells trees<sub>i</sub>.’

(Same-reference agents, no temporal sequence, second agent deleted.)

- f. (ta<sub>i</sub>            zhong shu<sub>i</sub>)<sub>i</sub> , (e<sub>i</sub>    mai4 shu<sub>i</sub>)<sub>i</sub>,  
      he,            plant trees, e<sub>i</sub>    sell trees,

'He<sub>i</sub> plants trees, and then sells trees<sub>i</sub>.'

(Same-reference agents, temporal sequence, second agent deleted.)

- g. (ta<sub>i</sub>            zhong shu<sub>i</sub>)<sub>i</sub> , (e<sub>i</sub>    mai4 shu<sub>i</sub>)<sub>i</sub>,  
      he,            plant trees, e<sub>i</sub>    sell trees,

'He plants trees<sub>i</sub> and sells them<sub>i</sub>.'

(Same-reference agents, same-reference patients, temporal sequence,  
 second agent deleted.)

- h. (ta<sub>i</sub>            zhong shu<sub>x</sub>)<sub>i</sub> , (e<sub>i</sub>    mai4 e<sub>x</sub>)<sub>i</sub>,  
      he,            plant trees<sub>x</sub> e<sub>i</sub>    sell e<sub>x</sub>

'He plants trees to sell.'

(Same-reference agents, same-reference patients, temporal sequence,  
 second agent and second patient deleted.)

Sentences in (19) are variations based on the same constituent-structure tree of (18). The constraints of shared reference and temporal sequence in the sense of Tai (1985) and Hsieh (1989a) affect the shapes of these variant forms. However, among these eight variants, only (19g) and (19h) would be qualified as the 'genuine' SVCs. The remaining ones are divergent from the SVCs and are considered coordinate constructions. All these genuine SVCs obey Tai's Principle of Temporal Sequence. In addition, some of them also have shared-reference NPs. Thus, we can view an SVC as a prototype which has a primary feature of temporal sequence, a secondary feature of shared reference, and some additional selective features for various subtypes.

## 2.8. Independent Argument for Our Analysis of SVCs

As we have shown, SVCs and coordinate constructions are different on the basis of the conceptual principle of temporal sequence and of the semantics of shared reference. We would like to relate our approach to a 'modular approach' undertaken by Huang (1988b) to treat the problem of A-not-A questions. The basic orientation in Huang 1988b is radically different from the traditional treatment. Traditionally, A-not-A questions such as (20a) are analyzed on a par with disjunctive questions such as (20b).

- (20) a. Ni mai    bu        mai    shu?  
          youbuy   not    buy    book

'Do you want to buy a book or not?'

- b. Ni mai shu haishi bu mai shu  
youbuy book or not buy book

'Do you want to buy a book or not?'

That is, both (20a) and (20b) are derived from the same underlying structure through coordination deletion. However, based on syntactic distribution, such as lexical integrity, preposition stranding, and island constraints, Huang showed that not all A-not-A questions can be derived from the same base structure as disjunctive questions. He further divided A-not-A questions into two types: A-not-AB and AB-not-A with regards to lexical integrity, preposition stranding, and island constraints. The former type is generated by a phonetic reduplication rule and thus does not have to obey lexical integrity principle, preposition stranding, or island constraints. The latter, which displays an intervention of B between two identical elements, is generated through anaphoric ellipsis and has to obey lexical integrity, preposition stranding, and island constraints. Anaphoric ellipsis deletes the element under identity and is not constrained by the Directionality Constraint of Ross. Disjunctive questions, however, have to obey these syntactic constraints.

Huang's treatment of A-not-A questions departs from the traditionally held hypothesis that disjunctive questions and A-not-A questions are derived from the same underlying structure. Huang is trying to separate two seemingly similar and historically-related types of questions, namely, A-not-A and disjunctive questions, into different structures. In essence, that is parallel to what we are trying to do here with SVCs and coordinate constructions. Although an evaluation of Huang's new approach is beyond the scope of this paper, it may be of interest to point out that both Huang's approach and our approach are based on the assumption of what Hsieh (1989b, 1990) has called grammatical interactions. Based on the four-way division of syntax into i-structure (iconic or conceptual structure), t-structure (thematic-structure), f-structure (functional-structure), and c-structure (constituent structure), as proposed in LFG, and based on Wang (1969), Labov (1966), Hsieh (1990) proposed a view of grammar in which internal competitions among these four components of syntax (as well as among other higher-level or lower-level interacting components of the grammar) are responsible for irregularity in historical syntactic changes and for variation in synchronic syntactic patterns. In other words, given any syntactic pattern, at any time in the history of a language, the i-structure, the t-structure, the f-structure, and the c-structure components are perpetually competing for their individual dominations over this particular syntactic pattern. This view gives a plausible interpretation to Jespersen's insight that 'language is always in a flux'. When historical irregularities and synchronic variations are disregarded, and when grammaticality is assumed to be an absolute rather than relative feature, our view would become somewhat similar to the so-called 'modular approach' in GB, as exemplified by C.-T. James Huang's (1988b) treatment of the A-not-A question in Mandarin Chinese.

Summarizing this section, we define SVCs as constructions that have verbs or verb-like phrases in series which have a shared reference, but not a shared object. We also discussed the Principle of Temporal Sequence as an independent principle for the serialization of verbs and for determining whether forward or backward coordination

deletions would apply. The Principle of Temporal Sequence and shared reference jointly provide a guideline for distinguishing SVCs from coordinate constructions.

### 3. Compound verbs

#### 3.1. A Statement of Problem

Extending our observation of deletion under same reference in the last section, we notice a similar pattern of deletion under same reference in the following sentence (21a), where deletion is through Huang's anaphoric ellipsis, which can apply across the sentence boundary:

- (21) a. Ta tui wo, wo dao le.  
he push I I fall ASP

'He pushed me, and I fell.'

Again, the two events are dependent in terms of temporal sequence, as one has to push someone before that someone falls. The one being pushed and the one who falls are the same one. Since the two events are in temporal sequence, and there is an identical entity involved, the conditions for deletion are met. The second NP, wo 'I', is deleted. The result should be grammatical, but in fact it is not:

- (21) b. \*Ta tui wo dao le.  
he push I fall ASP

We are facing a problem here. All the conditions are met for a sentence to be qualified as a SVC, but the sentence is not grammatical. Compare the surface order in sentence (21b) with that in sentences (3). We notice that sentence (3) is alright while sentence (21b) is not, although their constituent structures are the same. This brings us to another aspect of our analysis (as we mentioned in the beginning of this paper). That is, thematic structures of verbs.

Incorporation of the second verb with the first one occurs for sentence (21b) but not for sentence (3). This is demonstrated as follows:

- (22) Ta tui dao le wo.  
he push fall ASP I

'He pushed me down.'

- (23) \*Ta zhong mai4 cai.  
he plant sell vegetable

#### 3.2. Thematic Structure and Compound Formation

We assume that each lexical item has its own thematic structure, which is composed of thematic roles drawn from a universal inventory and arranged in a

descending order of agentivity as the one described in Bresnan and Kanerva 1989, stated as follows:

### Thematic Hierarchy

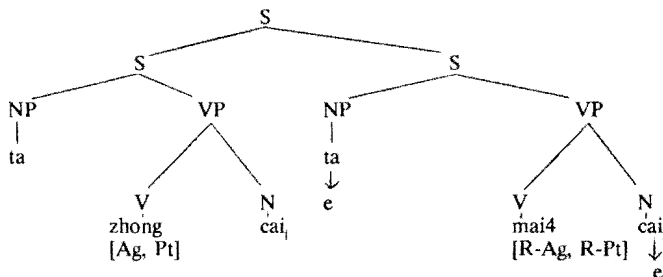
ag > ben > recip/exp > inst > th/pt > loc

Thematic roles are semantic concepts entailed in the lexical semantics of a predicate (Jackendoff 1972, 1987). The thematic roles of a predicate may be unspecified (Jackendoff 1987), but in general they cannot be reduced. A thematic role or structure is reduced when an NP which is the argument of a predicate becomes empty and the thematic role of this predicate (especially if there is only one thematic role in a predicate) cannot find an argument to which it can assign itself. When there is thematic reduction, incorporation or compounding occurs.

Let us pursue the notion of reduced thematic structure by examining the following two sentences:

- (24) Ta            zhong cai            mai4.  
he            plant vegetable            sell

'He plants vegetables to sell.'

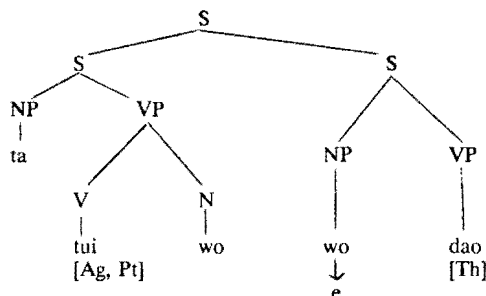


Both zhong 'plant' and mai4 'sell' have a thematic structure of [agent, patient]. Deletion deletes the second NP, and it creates a reduced thematic structure for mai4 'sell', represented as [R-ag, R-pt] (i.e. 'reduced-agent, reduced-patient'). Both the agent and the patient of the second verb are empty, since the subject and object NPs are empty. Although the second verb has a reduced thematic structure, that reduced thematic structure is deducible from the thematic structure of the first verb: since the two thematic structures are the same, references of the reduced patient and agent are indicated in the thematic structure of the first verb. Incorporation of the second verb with the first verb will not take place in this case.

The case of tui dao 'push down' is conceptually different. The second verb dao 'fall', as literature indicates (Sebba 1987, Baker 1989), is an unaccusative verb, which requires a theme role. Examine the following structure:

- (25) Ta        tui        dao        wo.  
he        push    fall    I

'He pushed me down.'



The verbs, tui 'push' and dao 'fall', have a thematic structure of [agent, patient] and [theme], respectively. Each thematic role is realized as indicated in the tree. The second copies of the non-theme NP (realized as wo 'I/me') is deleted under identity. The result of deletion leaves dao 'fall' a reduced thematic structure since its supporting NP wo 'I/me' is gone. This creates a situation in which the theme role of the second verb dao 'fall' is reduced but not inferable from the thematic structure of the first verb tui 'push'. For the lack of an explicit, unreduced thematic structure and for the lack of any structural elements within the same sentence to provide information about its thematic structure, the verb dao 'fall' cannot stand alone in the second conjunct. It must move into the first conjunct and be incorporated with the verb there. After incorporation, the two verbs jointly theta-mark the noun wo 'I'. In this position dao 'fall' finds an argument ta 'he' to discharge its thematic role. Although the original theme of dao 'fall' is VP-external (that is, a subject) and the new theme of dao 'fall' is VP-internal (that is, an object), the two theme roles refer to the same entity wo 'I/me'. This gives another strong support for our disagreement with Baker's idea of shared object, and for our claim that shared reference instead is the key to the constraints on SVCs in Mandarin Chinese. This movement is thus motivated and also provides partial support for Bresnan and Kanerva's thematic hierarchy (which they adapted from previous authors), in which theme and patient are in the same position. This theme role of dao 'fall' overrides the patient role of tui 'push' and the two verbs jointly assign the theme role to the following NP. Thus, we get the following sentences:

- (26) a. Ta tui        dao        le        wo.  
he push    fall    ASP    I

'He pushed me down.'

- b. Wo        tui        dao        le.  
I        push    fall    ASP

'I was pushed down.'  
'I pushed something and made it fall.'

- c. Ta tui le.  
he push ASP

'He pushed.'  
\* 'He was pushed.'

The distinction between the patient and theme roles is that the argument bearing the theme role can appear in the sentence initial position, but the patient role cannot (Bresnand & Kanerva 1989). Tui 'push', having a thematic structure of [agent, patient], cannot occur in a sentence such as (26c) if its initial noun is a theme. Tui dao 'push down', having a thematic structure of [agent, theme], can occur in sentence (26b), whose initial noun is a theme.

The adjacency constraint as Baker claimed does not exist. The second verb does not have a full thematic structure and is more like a clitic. A clitic will not block the theta assignment (cf. the placement of -le between the verb and the noun of a verb-noun compound as in kan le shu 'read the book'). The two verbs form a new lexical item and jointly theta mark the noun phrase that follows. Compounding occurs when there is a reduced thematic structure in the second conjunct, and the thematic role in the reduced structure cannot find a noun phrase within that conjunct to discharge its theta role.

### 3.3. Temporal Sequence as an Independent Principle

We will go back to temporal sequence as a constraint for defining SVCs and further substantiate the claim that temporal sequence is an independent principle from thematic-structure constraints. Compare following sentences:

- (27) Ta zhong shu mai4.  
he plant tree sell

'He plants trees to sell.'

- (28) \*Ta zhong shu mai3.  
he plant tree buy

- (29) Ta mai3 shu zhong.  
he buy tree plant

'He buys trees to plant.'

- (30) \*Ta mai4 shu zhong.  
he sell tree plant



We notice that sentences (28) and (30) have the same thematic structures as (27) and (29), respectively. Therefore, the ungrammaticality of (28) and (30) cannot be due to a violation of any thematic-structure constraint but must be due to a violation of the temporal-sequence principle. In (28) Tai's temporal sequence principle is violated, because mai3 'buy' precedes zhong 'plant' temporally but is not ordered before it syntactically. Similarly, in (30), zhong 'plant' precedes mai4 'sell' temporally but is not ordered before it syntactically.

### 3.4. Dowty's Neo-Davidsonian system of thematic roles.

The fact that reduced thematic roles are a reasonable explanation for the restrictions on compound formation remains even if we adopt a more logically-minded approach to thematic structures. In particular, the fact remains even if we shift from Bresnan and Kanerva's system to Dowty's (1986) Neo-Davidsonian system. In Dowty's Neo-Davidsonian system of thematic roles, no matter how many (traditional) arguments a verb has, that verb is treated as if it were a one-place predicate whose only argument is simply the event itself. The thematic roles are relations between the traditional arguments and the event. Adverbs are treated like verbs, and therefore as a one-place predicate taking the event as its only argument. The following is the formula for the representation of thematic roles of sentence (31) in the Neo-Davidsonian system:

(31) Jones buttered the toast at midnight in the bathroom.

#### Formula

(32) *Ee* [buttered (e) & Agent (Jones, e) & Patient (the-toast, e) & at-midnight (e) & in-the-bathroom (e)]

Applying the Neo-Davidsonian system of thematic roles to Mandarin serial verbs is to convert some kind of two-event formula into a kind of one-event formula. For example, consider the following:

(33) Zhangsan      he      wan      le      jiu.  
Zhangsan      drink   finish/up   ASP   liquor

a. 'John finished drinking the liquor.'

b. 'John drank up the liquor.'

The one-event solution for sentence (33) will have the following formula:

(34) a. *Ee* [drink-finish (e) & Agent (John, e) & Patient (liquor, e)]

b. *Ee* [drink-up (e) & Agent (John, e) & Theme (liquor, e)]

Notice that liquor is patient in (34a) but theme in (34b).

The two-event solution for sentence (33) will yield the following formula:

- (35) a. *Ee Ef* [drink (e) & Agent (John, e) & Patient (liquor, e) & finish (f) & R-Agent (John, f)] (note: 'R-' means 'reduced'.)
- b. *Ee Ef* [drink (e) & Agent (John, e) & Theme (liquor, e) & up (f) & R-Theme (liquor, f)]

Converting two-event formula into one-event formula requires the following two operations:

- a. If an event has a reduced agent (i.e. R-Agent) or a reduced theme (i.e. R-Theme), then delete the conjunct containing that reduced thematic role.
- b. Merge the two events so that the event with a reduced thematic role becomes the second part of a two-part event, thus drink-finish and drink-up.

Speculation on the motivation for this conversion, and ultimately, for Mandarin compound formation may be made in the following fashion: In a two-event formula, such as (35a), without the prefix R- expressing a reduced thematic role, it would not be clear whether John in 'Agent (John, e)' and John in 'Agent (John, f)' denote the same individual. The prefix R- indirectly makes sure that the two John's have identical reference. Since the reduced John is identical in reference to the un-reduced John, its deletion seems natural and the eventual compounding of the two verbs also seems a natural (although not universal) consequence of this deletion.

In summary, we proposed a restriction on compound formation by resorting to the thematic structure of predicates. When a thematic structure is reduced and is not deducible within its conjunct, compounding occurs. We also showed temporal sequence as an independent principle from thematic structure constraints.

#### 4. Co-verbial phrases

In the last section we discussed compounding as a result of deletion and reduced thematic structure. We will extend the idea of reduced thematic structure to explain co-verbs. Co-verbs do not involve deletion and compounding. However, they involve, in essence, a reduced thematic structure. In this section, we will discuss only one case of reduced thematic structure, and that is the benefactive role.

Examine the following:

- (36) a. Ta gei wo mai le yi ben shu.  
he give I buy ASP one MW book
- a. 'He bought a book for me.'  
b. 'He bought a book to give to me.'
- b. Ta mai le yi ben shu gei wo  
he buy ASP one MW book give I

'He bought a book and gave it to me.'

Sentence (36a) is ambiguous as the English translation indicates. Gei 'give' in sentence (36a) has a goal (to) as well as benefactive (for) interpretation, while gei 'give' in sentence (36b) has only one interpretation, i.e. goal (to). Gei 'give' as a full-fledged verb has a thematic structure of [agent, patient, goal]. Sentence (36a) has a full form as follows:

- (37) Ta      gei      wo      yi      ben      shu,      ta      mai      le      yi      ben  
       he      give    I      one    MW    book    he      buy    ASP    one    MW  
       shu.  
       book

'He gave me a book; he bought a book.'

When both yi ben shu 'one book' refer to the same thing, deletion applies and it results in the following sentence:

- (38) Ta      gei      wo      mai      le      yi      ben      shu.  
       he      give    I      buy    ASP    one    MW    book

'He bought a book to give to me.'

Goal role (assigned to wo 'I') in the thematic structure of gei 'give' is not reduced, and thus sentence (38) has the interpretation of to me, a goal meaning. Gei in sentence (36b) has the thematic structure of [agent, patient, goal], and two verbs mai 'buy' and gei 'give' are in temporal sequence relation. Deletion through anaphoric ellipsis applies to eliminate the second identical element. Deletion reduces the patient role but not the goal role, since only the patient NP yi ben shu 'a book' is deleted. Therefore, the postverbal gei 'give' in sentence (36b) has the additional goal interpretation of to me.

What about the benefactive interpretation contained in sentence (36a)? Gei is here a 'degenerated' verb (or a 'co-verb', as it is usually called in Mandarin Chinese grammars), having a 'reduced' thematic structure of [agent, benefactive] (which is not derived by deletion but is a result of historical development) rather than the full [agent, patient, goal]. In this case, the benefactive role is assigned to the noun directly following the verb. Thus, we get the benefactive interpretation.

In this section, we discussed ambiguity of preverbal gei and attributed it to the ambivalent thematic structure of the lexical item gei. When occurring alone without another verbs, gei 'give' is a full verb with a thematic structure of [agent, patient, goal]. When gei 'give' is in the second verb position, it has temporally-sequenced relation with the previous verb and it retains this full thematic structure. However, when gei occurs in the first verb position, it may take on a reduced thematic structure of [agent, benefactive] in addition to its full thematic structure of [agent, patient, goal]. Therefore, ambiguity results.

## 5. The Placement of Perfective Aspect Marker -le

Mandarin usually does not use syntactic markers to indicate syntactic relationship. Perfective aspect marker is one of the very few syntactic markers. In this section, we will discuss the principle of -le placement. We will discuss the relation between the thematic structure of a verb and the placement of -le. This is partly to question Baker's double-headed VP condition for SVCs. We will show that there is only one aspect marker in each serial verb construction but not two, contrary to what Baker would predict with his double-headed VP, and furthermore the placement of -le is constrained by the thematic structure of verbs.

### 5.1. The placement of -le and thematic structure

Bresnan and Kanerva noted that grammaticalization of verb-agreement markers proceeds from the highest role downward (Bresnan & Kanerva 1989: 24). There is no verb-agreement in Mandarin Chinese, and the placement of -le plays a similar role of grammaticalization of verb agreement. That is, -le placement proceeds from the highest role downward. The verb with a 'stronger' thematic structure of [agent, patient] or [agent, theme] will likely attract -le more easily than verbs with a 'weaker' thematic structure, such as [agent, benefactive] or [agent, goal]. Let us try this idea first on an SVC sentence, sentence (3), repeated below as sentence (39) for easy reference.

- (39) Ta            zhong cai            mai4.  
he            plant vegetable            sell

'He grows vegetables to sell.'

Zhong 'plant' has a thematic structure of [agent, patient]. The perfective aspect marker (PF) -le would be attracted. It is correct, as the following sentence shows.

- (40) Ta            zhong le            cai            mai4.  
he            plant PF            vegetable            sell

'He grew vegetables to sell.'

Mai4 'sell', as we discussed previously, has a reduced thematic structure of [R-agent, R-patient]. Reduced thematic structure will not attract -le, as the following sentence demonstrates:

- (41) ?Ta            zhong cai            mai    le.  
he            plant vegetable            sell    PF

'He has grown vegetables to sell.'

Sentence (41) is marginal, at best, because the -le placed after the second verb coincides with the the homophonous sentence-final particle le (termed CRS, Currently Relevant State, by Li & Thompson 1981). If a time phrase is added, the grammaticality can be easily detected. Compare the following sentences:

- (42) a. Ta qunian cengjing zhong le cai mai.  
he last year HAS BEEN plant PF vegetable sell

'Last year he had grown vegetables to sell.'

- b. ??Ta qunian cengjing zhong cai mai le.  
he last year HAS BEEN plant vegetable sell PF

Sentence (42b) can be made grammatical by continuing the sentence with an explicit 'measure' phrase, as follows:

- (43) Ta qunian cengjing zhong cai mai le wu  
he last year HAS BEEN plant vegetable sell ASP five  
  
bai kuai qian.  
hundred MW money

'Last year he sold 500 dollars worth of vegetables he grew.'

We have demonstrated that the placement of *-le* is determined by the thematic structure of a verb. Verbs with a strong thematic structure of [agent, theme] or [agent, patient] will attract *-le*.

## 5.2. The placement of *-le* and co-verbial phrases

The placement of *-le* in the following sentences confirms our hypothesis that placement of *-le* depends crucially on the thematic structure of verbs in a sentence. Consider the following:

- (44) a. Ta gei wo mai le yi ben shu.  
he give I buy ASP I MW book

'He bought a book for/to give to me.'

- b. Ta mai le yi ben shu gei wo.  
he buy ASP I MW book give I

'He bought a book to give to me.'

- c. \*Ta gei le wo mai yi ben shu.  
he give ASP I buy I MW book

- d. \*?Ta mai le yi ben shu gei le wo.  
he buy ASP I MW book give ASP I

*Gei* in sentences (44c) and (44d) both have a reduced thematic structure of [agent, goal, R-patient], and placing aspect marker after reduced thematic structure makes both sentences bad. However, in terms of degree of grammaticality, sentence (44d) is better than sentence (44c). This is due to the fact that *gei* in sentence (44c) has an additional

interpretation which involves two reduced thematic roles and has the thematic structure of [agent, benefactive, R-goal, R-patient], while *gei* in sentence (44d) has only one reduced thematic role (i.e. R-patient).

Compare sentence (44d), which is marginal, with sentence (45), which is totally ungrammatical.

- (45) \*Wo mai yi ben shu gei le ta.  
I buy one MW book give ASP he

The ungrammaticality of sentence (45) shows that the placement of *-le* has to observe a constraint: only after the verb with an [agent, patient] thematic structure is assigned the perfective marker *-le*, can the verb with a weaker thematic structure be assigned another *-le*.

### 5.3. The placement of *-le* and compound verbs

Compound verbs in Mandarin is a special phenomenon in the typology of serial verb constructions (Sebba 1987). The placement of *-le* coincides with the prominent point in the thematic structure of a VV compound. The fact that a VV compound only allows one aspect marker makes us rethink Baker's double-headed VP analysis. Compare the following sentences:

- (46) a. Ta tui dao le wo.  
he push fall ASP I  
'He pushed me down.'
- b. \*Ta tui le dao wo.  
he push ASP fall I
- c. \*Ta tui le dao le wo.  
he push ASP fall ASP I

*Tui dao* 'push down' in sentence (46a) has a thematic structure of [agent, theme], which is the optimal place for attracting *-le*. Thus, *-le* is placed there, and the sentence is grammatical. *Tui* 'push' in sentence (46b), though it has a full-fledged thematic structure of [agent, patient], will not attract *-le*, because the placement of *-le* will leave a reduced thematic structure of *dao* 'fall' dangling. Thus, the ungrammaticality of sentence (46b) is explained. Sentence (46c) has a *-le* placed after the reduced thematic structure *dao* 'fall', a violation of our *-le* placement principle. Thus, the sentence is bad.

Summarizing what we have discussed so far, we conclude that the perfective aspect marker *-le* is placed according to the thematic structure of verbs in the sentence. Only a 'stronger', full-fledged thematic structure of [agent, patient] or [agent, theme] will receive the perfective aspect marker *-le*. Reduced thematic structure will not receive an aspect marker. There can be only one perfective aspect marker in an SVC, which, as discussed in this paper, include co-verbal phrases, VV compounds, and verbs-in-series.

## 6. Conclusion

We conclude that SVCs are constrained by temporal sequence and shared reference, not shared object. Baker's double-headed VP analysis of SVCs requires serious rethinking when taking the inflection morphology and compounding in Mandarin Chinese into consideration. In recent developments, syntactic theories have shifted their attention from constituent structures to the study of the relationships among conceptual, thematic, functional, and constituent structures. One such endeavor is the Lexical Mapping Theory in Lexical Functional Grammar (LFG) (Bresnan and Kanerva 1989, C. Huang 1989a, b), in which the thematic structure (largely determined by conceptual structure as outlined in Jackendoff 1987) is mapped into the functional structure (subject, object, oblique cases etc.). Government and Binding Theory (GB), on the other hand, strives to address the same issue of linking (rather than mapping) between thematic structure and constituent structure. However, the GB approach is conceptually different from LFG in that mapping is done from constituent structure to thematic structure. Once constituent structure is given, theta markings and case markings follow. The notion of head and the percolation principles are designed to suit the needs of theories rather than to describe and explain language phenomena (see discussion in Zwicky 1985). Baker's Head-Licensing Condition (HLC) is one such example: The Projection Principle and Theta Criteria will be violated if the double-head is not licensed in the theory. Once it is licensed, everything falls into place. Inflection morphology (the placement of *-le* in Mandarin Chinese) refutes Baker's double-headed VP analysis of SVCs.

Based on our discussion above, we would like to point out that principles dominating languages should be drawn from the conceptual world rather than from surface structure, because surface structure is just a reflection of conceptual reality. Thus mapping between conceptual structure and lexical semantic structure has to be from conceptual structure to thematic structure, as demonstrated in LFG, not the other way around, as outlined in GB.

As a final remark, we wish to point out that the rather loosely characterized idea of parameters as a device for describing typological diversification has yet to find its convincing empirical support. In particular, Baker's idea of shared-object for the SVCs in African languages cannot easily extend to our idea of temporal sequence (and shared reference) for the SVCs in Mandarin Chinese by any imaginable way of parametric adjustment.

## Notes

1. This is the semantic classification for the first type of SVCs. Syntactically, it can be reduced to coordination and subordination. We will refer to alternating as coordination, and the rest as subordination. Only the subordination constructions are qualified as SVCs in our definition.

### References

- Baker, Mark C. (1988). Incorporation: a theory of grammatical function changing. Chicago: The University of Chicago Press.
- Baker, Mark C. (1989). Object sharing and projection in serial verb constructions. Linguistic Inquiry 20.513-53.
- Bresnan, J. ed. (1982). The mental representation of grammatical relations. Cambridge: MIT Press.
- Bresnan, Joan, and Jonni M. Kanerva. (1989). Locative inversion in Chichewa: a case study of factorization in grammar. Linguistic Inquiry 20.1-50.
- Carrier-Duncan, Jill. (1985). Linking of thematic roles in derivational word formation. Linguistic Inquiry 16.1-34.
- Chang, Claire Hsun-huei. (1989). Compounds in Mandarin Chinese: with special emphasis on resultative verb compounds. University of Hawaii Working Papers in Linguistics 20.59-85.
- Chang, Claire Hsun-huei. (1990). Complex verbs and thematic structure: interaction between syntax and morphology. Paper presented at the Second Northeast Conference on Chinese Linguistics, University of Pennsylvania, Philadelphia, May 4-6, 1990.
- Chao, Yuen Ren. (1968). A grammar of spoken Chinese. Berkeley: University of California Press.
- Chen, Matthew, and William S-Y. Wang. (1975). Sound change: actuation and implementation. Language 51.225-81.
- Chu, Chauncey. (1983). A reference grammar of Chinese for English speakers. New York: Peter Lang.
- di Sciullo, Anna-Maria, and Williams, Edwin. (1987). On the Definition of Word. Cambridge: the MIT Press.
- Dowty, David. (1986). On the semantic content of the notion "thematic role". To appear Property Theory, Type Theory and Natural Language Semantics (ed. by Gennaro Chierchia, Barbara Partee and Ray Turner). D. Reidel Publishing Company.
- Dowty, David. (1988). Thematic proto-roles, subject selection, and lexical semantic defaults. Paper presented at 1987 LSA Colloquium.
- Grimshaw, J., and Ralf-Armin Mester. (1985). Complex verb formation in Eskimo. Natural Language and Linguistic Theory 3.1-19.



- Hashimoto, Anne Y. (1964). Resultative verbs and other problems. POLA No. 8.
- Hsieh, Hsin-I. (1989a). History, structure, and competition. Paper presented at the Eighth International Workshop on Chinese Linguistics, POLA, University of California, Berkeley, March 20-21, 1989.
- Hsieh, Hsin-I. (1989b). Time and imagery in Chinese. In Functionalism and Chinese grammar (ed. by James H-Y. Tai and F. S. Hsueh), 45-94. Monograph series No. 1, Chinese Language Teachers Association.
- Hsieh, Hsin-I. (1990). In search of grammatical foundation for dialect subgrouping. Paper to be presented at the First International Symposium on Chinese Languages and Linguistics, Academia Sinica, Taipei, Taiwan, July 20-22, 1990.
- Huang, James C.-T. (1982). Logical relations in Chinese and the theory of grammar. MIT Ph.D. dissertation.
- Huang, James C.-T. (1984). Phrase structure, lexical integrity, and Chinese compounds. Journal of the Chinese Language Teachers Association 14.2:53-78.
- Huang, James C.-T. (1984). On the distribution and reference of empty Pronouns. Linguistic Inquiry 15.5:31-74.
- Huang, James C.-T. (1988a). Wo pao de kuai and Chinese phrase structure. Language 64.2:274-311.
- Huang, James C.-T. (1988b). Modularity and explanation: the case of Chinese A-not-A questions. In Proceedings of the Third Ohio State University Conference on Chinese Linguistics (ed. by Marjorie K.M. Chan and Thomas Ernst), 141-169. Bloomington: Indiana University Linguistics Club Publications.
- Huang, Chu-ren. (1989a). Mandarin Chinese and the lexical mapping theory. Paper presented at the 1989 International Conference on Sino-Tibetan Language and Linguistics, Honolulu, Hawaii, Oct. 6-8, 1989.
- Huang, Chu-ren. (1989b). On Mandarin Chinese predicates with subcategorized topics. Paper presented at Center for the Study of Language and Information, Stanford, Nov. 28, 1989.
- Huang, Shuan-fan. (1978). Historical change of prepositions and emergence of SOV order. Journal of Chinese Linguistics 6. 212-42.
- Huang, Shuan-fan. (1983). Morphology as a cause of syntactic change: the Chinese evidence. In Papers in Chinese syntax (ed. by Shuan-fan Huang), 229-54. Taipei: Literary Crane Press.
- Jackendoff, Ray. (1972). Semantic interpretation in generative grammar. Cambridge: MIT Press.

- Jackendoff, Ray. (1987). The status of thematic relations in linguistic theory. Linguistic Inquiry 18.369-411.
- Labov, William. (1966). The social stratification of English in New York City. Washington, D.C.: Center for Applied Linguistics.
- Li, Charles N., and Sandra A. Thompson. (1974). Co-verbs in Mandarin Chinese: verbs or prepositions? Journal of Chinese Linguistic 2:257-78.
- Li, Charles N., and Sandra A. Thompson. (1976a). Development of causative in Mandarin Chinese: interaction of diachronic processes. In Syntax and semantics 6: the grammar of causative construction (ed. by M. Shibatani). New York: Academic Press.
- Li, Charles N., and Sandra A. Thompson. (1976b). Subject and topic: a new typology of language. In Subject and topic (ed. by Charles N. Li). New York: Academic Press, 457-89.
- Li, Charles N., and Sandra A. Thompson. (1981). Mandarin Chinese: A functional reference grammar. Berkeley: University of California Press.
- Li, Yen-hui Audrey. (1990). Order and Constituency in Mandarin Chinese. Dordrecht: Kluwer Academic Publishers.
- Lieber, Rochelle. (1983). Argument linking and compounds in English. Linguistic Inquiry 14.251-85.
- Lord, Carol. (1973). Serial verbs in transition. Studies in African Linguistics 4, 269-96.
- Lord, Carol. (1976). Evidence for syntactic reanalysis: from verb to complementizer in Kwa. In Papers from the parasession on diachronic syntax. Chicago Linguistic Society, University of Chicago.
- Lord, Carol. (1982). The development of object marker in serial verb languages. In Syntax and semantics 15: studies in transitivity (ed. by Paul H. Hopper & Sandra A. Thompson), 277-99. New York: Academic Press.
- Perlmutter, D. (1978). Impersonal passives and the unaccusative hypothesis. Proceedings of the 4th annual meeting of the Berkeley Linguistics Society. Berkeley: University of California.
- Ross, John. (1967). Constraints on variables in syntax. MIT Ph.D Dissertation.
- Sebba, Mark. (1987). The syntax of serial verbs. Amsterdam: John Benjamins.
- Selkirk, Elizabeth O. (1984). The syntax of words. Linguistic Inquiry Monograph Cambridge: MIT Press.

- Tai, James H-Y. (1984). Word order in Chinese and the X' theory. Journal of the Chinese Language Teachers Association 14.23-36.
- Tai, James H-Y. (1985). Temporal sequence and Chinese word order. In Iconicity in syntax: proceedings of a symposium on iconicity in syntax, Stanford, June 24-6, 1983 (ed. by John Haiman), 49-72. Amsterdam: John Benjamins Publishing Co. 1985.
- Tai, James H-Y. (1989). Toward a cognition-based functional grammar of Chinese. In Functionalism and Chinese grammar (ed. by James H-Y. Tai and F.S. Hsueh), 187-226. Monograph Series No. 1, Chinese Language Teachers Association.
- Tai, James H-Y. (ms). Iconicity: motivation in Chinese Syntax. Paper presented at the First Northeast Conference on Chinese Linguistics, The Ohio State University, May 5-7, 1989.
- Talmy, Leonard. (1985). Lexicalization patterns: semantic structure in lexical forms. In Language typology and syntactic description: vol III. grammatical categories and the lexicon (ed. by Timothy Shopen), 57-149. Cambridge: Cambridge University Press.
- Tang, Ting-chi. (1988a). On the notion "possible verbs of Chinese". Tsing Hua Journal of Chinese Studies 18.43-69.
- Travis, Lisa. (1984). Word Order Parameters. MIT Ph.D Dissertation.
- Travis, Lisa. (1987). Parameters of phrase structure. McGill Working papers in Linguistics 4.121-40.
- Tsao, Feng-fu. (1979). A functional study of topic in Chinese: a first step towards discourse analysis. Taipei: Student Book Co. Ltd.
- Tsao, Feng-fu. (1986). A topic-comment approach to the ba construction. Journal of Chinese Linguistics 15.1-55.
- Tsao, Feng-fu. (1986). Serial verb constructions in Chinese. Paper presented at the Second International Conference on Sinology, Academia Sinica, Taipei, Taiwan, Dec. 29-31, 1986.
- Wang, Li. (1980). Hanyu shigao [History of Chinese language]. Shanghai: Kexue Yinshu Guan.
- Wang, William S-Y. (1965). Two aspect markers in Mandarin. Language 45.457-71.
- Wang, William S-Y. (1969). Competing change as a cause of residue. Language 45.9-25.
- Wilkins, Wendy. (1988). Syntax and Semantics 21: Thematic Relations. San Diego: Academic Press, Inc.

- Williams, Edwin. (1981). Argument structure and morphology. The Linguistic Review 1.81-114.
- Williams, Edwin. (1981). On the notions 'lexically related' and 'head of a word'. Linguistic Inquiry 12.245-74.
- Zubizaretta, Maria Luisa. (1985). The relation between morphophonology and morphosyntax: the case of Romance Causatives. Linguistic Inquiry 16.247-89.
- Zwicky, Arnold M. (1985). Heads. Journal of Linguistics. 21.1-29.1985.